Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1.   (Currently Amended)   A ~~Transmitting~~ transmitting apparatus for transmitting data to a radio station, the apparatus comprising:

~~a.~~an array antenna including M, ~~(M is an integer of 2 or more)~~ pieces of antenna elements for receiving a carrier modulation signal of a known symbol that is transmitting from a radio station and for transmitting a signal to the radio station, where M is an integer of 2 or more;

~~b.~~a reference symbol generation means for generating a reference symbol that gives a phase reference and is the same symbol with the known symbol;

~~c.~~a propagation channel estimation means for generating ~~M pieces of~~ a receiving ~~symbols~~ symbol from a baseband signal received at the antenna elements based on the reference symbol, wherein the receiving symbols are estimate values for a complex propagation channel between a transmitting antenna of the radio station and the array antenna;

a transmitting symbol calculation means for calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, the plural sets of transmitting symbol vectors being for controlling any one of receiving power and phase of the radio station;

a symbol mapping means for generating transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data; and

a carrier modulation means for generating baseband signals from the

transmitting symbols; and

a transmitting means for converting baseband signals to radio frequency signals to transmit the radio frequency signals to the radio station through the array antenna.

2.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 1, further comprising a carrier separation means for separating the baseband signal received at the M pieces of antenna elements into N ~~(N is an integer of 2 or more)~~ pieces of sub-carriers, where N is an integer of 2 or more, wherein:

the carrier modulation signal is configured by multiple carriers, and

said carrier separation means, after separating the received baseband signal into N ~~(N is an integer of 2 or more)~~ pieces of sub-carriers, generates "M x N" pieces of receiving symbols that are estimate values of a complex propagation channel based on the reference symbol, where N is an integer of 2 or more.

3.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 1, wherein:

said propagation channel estimation means, after applying a reverse spread separation process to the baseband signal received at the M pieces of antenna elements with N ~~(N is an integer of 2 or more)~~ pieces of spread codes, generates "M x N" pieces of receiving symbols that are estimate values of a complex propagation channel based on the reference symbol, where N is an integer of 2 or more.

4.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 1, ~~wherein:~~ wherein

the M pieces of antenna elements configuring said array antenna have a mutually-different directional pattern, or mutually-different polarization.

5.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 2, ~~wherein:~~ wherein

the M pieces of antenna elements configuring said array antenna have a

mutually-different directional pattern, or mutually-different polarization.

6.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 3, ~~wherein:~~ wherein

the M pieces of antenna elements configuring said array antenna have a mutually-different directional pattern, or mutually-different polarization.

7.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 1, wherein ~~further comprising:~~

~~a.~~ a transmitting symbol calculation means ~~for: calculating~~ calculates the plural sets of transmitting symbol vectors from the M pieces of receiving symbols so that ~~the~~ each transmitting symbol vector is configured by M pieces of transmitting ~~symbols;~~ symbols, ~~then generating a reference table configured by the plural sets of transmitting symbol vectors;~~

~~b.~~ a ~~the~~ symbol mapping means ~~for generating~~ generates M pieces of transmitting symbols by selecting one set of transmitting symbol vector from the reference table based on transmitting ~~data;~~ data, and

~~c.~~ a ~~the single~~ carrier modulation means ~~for generating~~ generates baseband signals from the M pieces of transmitting symbols.

8.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 2, wherein ~~further comprising:~~

~~a.~~ a transmitting symbol calculation means ~~for: calculating~~ calculates plural sets of transmitting symbol vectors from the "M x N" pieces of receiving symbols for each of N pieces of sub-carriers so that each vector is configured by M pieces of transmitting ~~symbols;~~ symbols and then generating reference tables configured by the plural sets of transmitting symbols ~~vector;~~ vector,

~~b.~~ a symbol mapping means ~~for generating~~ generates "M x N" pieces of transmitting symbols by selecting one set of transmitting symbol vector from each of N pieces of reference tables that correspond to the N pieces of sub-carriers based on ~~a~~ transmitting ~~data;~~ data and

~~c.~~a single carrier modulation means ~~for generating~~generates transmitting baseband signals from "M x N" pieces of transmitting symbols with N pieces of sub-carrier elements.

9.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 3~~, further comprising:~~

~~a.~~the transmitting symbol calculation means ~~for: calculating~~calculates plural sets of transmitting symbol vectors from "M x N" pieces of receiving symbols for each of N pieces of spread codes so that each transmitting symbol vector is configured by M pieces of transmitting ~~symbols;~~symbols and then generating reference tables configured by the plural sets of transmitting symbol ~~vectors;~~vectors,

~~b.~~a symbol mapping means ~~for generating~~generates "M x N" pieces of transmitting symbols by selecting one set of transmitting symbol vector from each of the N pieces of reference tables that correspond to the N pieces of spread codes respectively, based on ~~a~~transmitting data including confidential ~~information ;~~information, and

~~c.~~a ~~single~~carrier modulation means ~~for generating~~generates transmitting baseband signals from the "M x N" pieces of transmitting symbols by spread process with N pieces of reverse spread codes.

10.   (Cancelled)

11.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 8, wherein:

said transmitting symbol calculation means generates the plural sets of symbol vectors in order to control any one of receiving power and phase of the radio station.

12.   (Currently Amended)   The ~~Transmitting~~ transmitting apparatus according to claim 9, wherein:

said transmitting symbol calculation means generates the plural sets of symbol vectors in order to control any one of receiving power/phase of the radio station.

13.   (Currently Amended) A ~~Receiving~~ receiving apparatus for receiving data from a transmitting apparatus, the apparatus comprising:

an antenna for transmitting carrier a carrier modulation signal including a known symbol and for receiving a signal from the transmitting apparatus;

~~a.~~a propagation parameter estimation means for estimating a propagation parameter from a ~~receiving~~ received signal to generate receiving symbols, the received signal being a signal including a transmitting symbol generated based on transmitting data and plural sets of transmitting symbols calculated from the known symbol in the transmitting apparatus; and

~~b.~~a symbol determination means for reconstructing a the transmitting data from the receiving symbols~~based on the propagation parameter~~.

14.   (Currently Amended) The ~~Receiving~~ receiving apparatus according to claim 13 further comprising a carrier separation means for separating the receiving signal, which is configured by multiple carriers, into a plurality of sub-carriers, wherein:

said propagation parameter estimation means estimates a propagation parameter for each of the sub-carriers and the symbol determination means reconstructs a transmitting data from the ~~receiving~~ received signal for each of the sub-carriers.

15.   (Currently Amended) The ~~Receiving~~ receiving apparatus according to claim 14, wherein:

the sub-carriers are any one of an OFDM signal that is so configured as to be mutually-orthogonal in a frequency space and a CDMA signal that is so configured as to be mutually-orthogonal in a code space.

16.   (Currently Amended) The ~~Receiving~~ receiving apparatus according to claim 14, wherein ~~comprising:~~

an array antenna that is configured by at least one antenna element, wherein said propagation parameter estimation means estimates the propagation parameter

for each of the antenna to generate the receiving symbols.

17.   (Currently Amended)   The ~~Receiving~~ receiving apparatus according to claim 15, wherein ~~comprising:~~

an array antenna that is configured by at least one antenna element, wherein said propagation parameter estimation means estimates the propagation parameter for each of the antenna to generate the receiving symbols.

18.   (Currently Amended)   A ~~Receiving~~ receiving apparatus for receiving data from a transmitting apparatus, the apparatus comprising:

an antenna for transmitting carrier a carrier modulation signal including a known symbol and for receiving a signal from the transmitting apparatus;

~~a.~~a propagation parameter estimation means for generating a receiving symbol that is a complex symbol by applying orthogonal detection to a received baseband signal, the received baseband signal being a signal including a transmitting symbol generated based on transmitting data and plural sets of transmitting symbols calculated from the known symbol in the transmitting apparatus; and

~~b.~~a symbol determination means for reconstructing a transmitting data from the receiving symbol based on predetermined criteria.

19.   (Currently Amended)   The ~~Receiving~~ receiving apparatus according to claim 18, further comprising: a carrier separation means for separating the baseband signal, which is configured by a multiple carriers, into N ~~(N is an integer of 2 or more)~~ pieces of sub-carrier elements, where N is an integer of 2 or more, wherein:

said propagation parameter estimation means generates the receiving symbol for each of the sub-carriers after said carrier separation means separates the baseband signal into the sub-carriers.

20.   (Currently Amended)   The ~~Receiving~~ receiving apparatus according to claim 18, ~~wherein:~~wherein

the symbol determination means reconstructs a~~transmitting~~ data based on predetermined criteria after said propagation parameter estimation means applies a reverse spread process to the baseband signal with N ~~(N is an integer of 2 or more)~~ pieces of spread codes, where N is an integer of 2 or more.

21.   (Currently Amended)   The ~~Receiving~~ receiving apparatus according to claim 19, ~~wherein:~~wherein

said symbol determination means determines a~~the~~ receiving symbol based on the receiving power of the antenna.

22.   (Currently Amended)   The ~~Receiving~~ receiving apparatus according to claim 20, ~~wherein:~~wherein

said symbol determination means determines a~~the~~ receiving symbol based on the receiving power of the antenna.

23.   (Currently Amended)   A radio communication method of transmitting a~~data~~ on a single carrier from a first radio station to a second radio station, comprising the steps of:

a.~~transmitting~~ an~~information~~ known by both radio stations from the second radio station to the first radio station;

b.~~estimating~~ a propagation parameter, which is a parameter of a propagation channel shared only between the first radio station and the second radio station, based on the known information and received information transmitted from the second radio station by the first radio station;

c.~~transmitting~~ a~~data~~ from the first radio station to the second radio station by superimposing the transmitting data including a confidential information on the estimated propagation parameter;

d.~~calculating~~ a plurality of propagation parameters that are obtained from receiving signals of a plurality of antennas in the second radio station; and

e.~~reconstructing~~ the transmitting data based on a plurality of propagation

parameters calculated by the second radio station, wherein

said step of estimating a propagation parameter includes the steps of

generating a receiving symbol from the information transmitted from the second radio station, and

calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, wherein the plural sets of transmitting symbol vectors is for controlling any one of receiving power and phase of the radio station.

24.   (Currently Amended) A radio communication method of transmitting a data on a multiple carriers from a first radio station to a second radio station, comprising the steps of:

a. transmitting a information known by both radio stations from the second radio station to the first radio station;

b. estimating a propagation parameter, which is a parameter of a propagation channel shared only between the first radio station and the second radio stations, based on the known information and received information transmitted from the second radio station by the first radio station;

c. transmitting a data from the first radio station to the second radio station by superimposing the transmitting data on the estimated propagation parameter;

d. calculating a plurality of propagation parameters obtained from receiving signals of a plurality of antennas in the second radio station; and

e. reconstructing the transmitting data based on the a plurality of propagation parameters calculated in the second radio station,

wherein said step of estimating a propagation parameter includes the steps of

generating a receiving symbol from the information transmitted from the

second radio station, and

calculating plural sets of transmitting symbol vectors from the receiving symbols so that each transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, wherein the plural sets of transmitting symbol vectors is for controlling any one of receiving power and phase of the radio station.

25.   (Currently Amended) A The radio communication method according to claim 24, wherein:wherein

the second radio station reconstructs the transmitting data based on the propagation parameter estimated from the receiving signal for each carrier configuring the multiple carriers.

26.   (Currently Amended) A The radio communication method according to claim 25, wherein:wherein

each carrier configuring the multiple carriers is any one of a OFDM signal that is so configured as to be mutually-orthogonal in a frequency space and a CDMA signal that is so configured as to be mutually-orthogonal in a code space.

27.   (Currently Amended) A radio communication system of transmitting a data by a single carrier modulation method from a first radio station to a second radio station, comprising:

a.the first radio station comprising;

(a1) a propagation channel estimation means for estimating a propagation channel parameter including receiving symbols shared only between the first radio station and the second radio station, when the first radio station transmits a data including a confidential information to a second radio station; and

a transmitting symbol calculation means for calculating plural sets of transmitting symbol vectors from the receiving symbols so that each

transmitting symbol vector is configured by plural sets of transmitting symbols and then generating a reference table configured by the plural sets of transmitting symbol vectors, the plural sets of transmitting symbol vectors being for controlling any one of the receiving power and phase of the radio station; a symbol mapping means for generating transmitting symbols by selecting one set of the transmitting symbol vector from the reference table based on transmitting data; and

(a2) a transmitting means for generating a carrier modulation signal from the transmitting symbols and transmitting a signal including information of the transmitting data from the first radio station to the second radio station, by superimposing a transmitting signal on the estimated propagation channel parameter;

and

b. the second radio station comprising;

(b1) a propagation parameter estimation means for calculating a plurality of propagation parameters obtained from receiving signals of a plurality of antennas; and

(b2) a symbol determination means for reconstructing a transmitting data from the first radio station based on a plurality of the calculated propagation parameters, wherein:wherein

the data transmitting from the first radio station to the second radio station includes confidential information.

Amendments to the Drawings:

The attached sheets of drawings include changes to Figures 3-5, 7, 9-11, 13, 16-17, and 21-22. These sheets replace the original sheets.